Volunteer Lake Assessment Program Individual Lake Reports

SUNRISE LAKE, MIDDLETON, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,112	**Max. Depth (m):**	4.1	**Flushing Rate (yr^{-1})**	2
Surface Area (Ac.):	257	**Mean Depth (m):**	1.9	**P Retention Coef:**	0.71
Shore Length (m):	5,500	**Volume (m^3):**	1,966,000	**Elevation (ft):**	666

TROPHIC CLASSIFICATION

Year	Trophic class
1977	OLIGOTROPHIC
1990	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2018 305(b) report on the status of N.H. waters, and are based on data collected from 2008-2017. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm

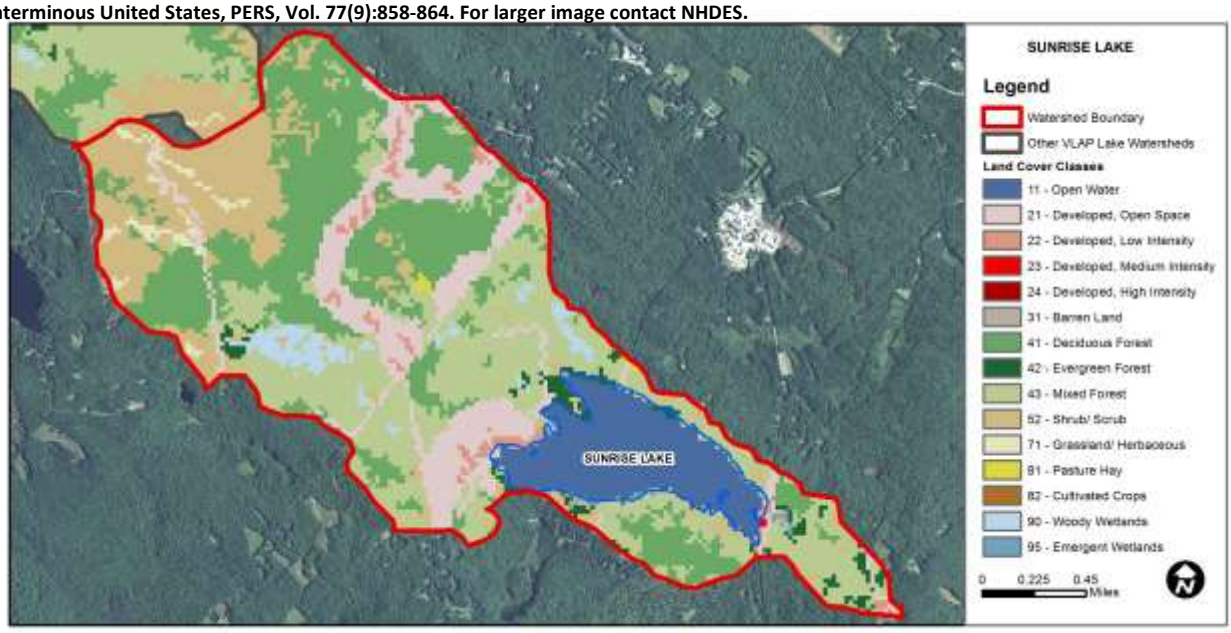
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	Data exceed water quality standards or thresholds for a given parameter by a small margin.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Dissolved oxygen satura	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Chlorophyll-a	Slightly Bad	Data exceed water quality standards or thresholds for a given parameter by a small margin.
Primary Contact Recreation	Escherichia coli	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

SUNRISE LAKE - TOWN BEACH	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	10.2	Barren Land	0	Grassland/Herbaceous	1.14
Developed-Open Space	13.2	Deciduous Forest	27.25	Pasture Hay	0.2
Developed-Low Intensity	1.75	Evergreen Forest	2.04	Cultivated Crops	0
Developed-Medium Intensity	0.04	Mixed Forest	26.96	Woody Wetlands	2.24
Developed-High Intensity	0	Shrub-Scrub	14.68	Emergent Wetlands	0.28

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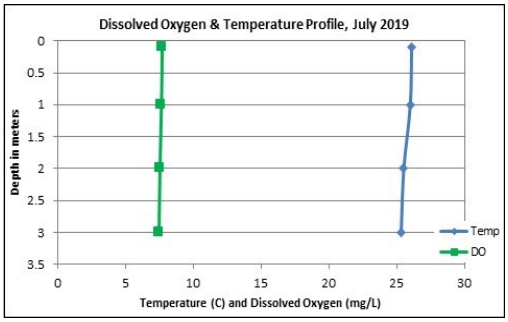
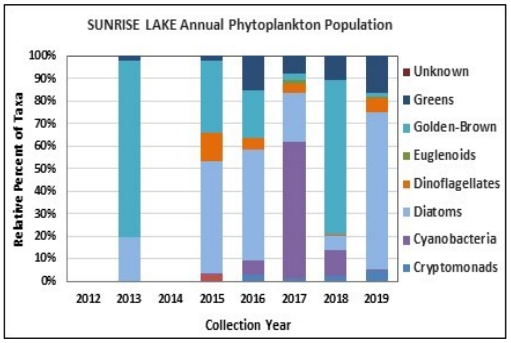
Sunrise Lake, Middleton
2019 Data Summary

Recommended Actions: Lake nutrient levels are generally representative of oligotrophic conditions, however algal growth (chlorophyll-a) is greater than expected for oligotrophic lakes and is more representative of mesotrophic conditions. This could indicate the presence of a micronutrient feeding algal growth. Conductivity and chloride levels have significantly increased highlighting the negative impacts of winter road salt usage. Encourage local road agents and winter maintenance companies to obtain a Voluntary Salt Applicator license through UNH T2's Green SnowPro Certification program. Consider implement low salt zones along roadways close to the water's edge. Keep up the great work!

Observations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were slightly elevated in July, decreased from 2018, were slightly greater than the state median, and were much greater than the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Epilimnetic, Pinkham Cove and Tanglewood Bk. conductivity and/or chloride levels were greater than the state medians and indicative of human influences. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began and significantly increasing epilimnetic chloride levels since 2011.
- **Color:** Apparent color measured in the epilimnion indicates the lake is lightly tea colored, or light brown.
- **E. coli:** Main Beach, Nicola Beach, Nicola Beach 1, Pinkham Cove, and Town Beach E. coli levels were low and much less than the state standards for public beaches and surface waters.
- **Total Phosphorus:** Epilimnetic, Pinkham Cove and Tanglewood Bk. phosphorus levels were within a low range. Average epilimnetic phosphorus level increased slightly from 2018, was less than the state median, and was slightly greater than the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable epilimnetic phosphorus levels since monitoring began.
- **Transparency:** Transparency measured without the viewscope (NVS) was within an average range for the lake, decreased slightly from 2018 and was slightly less than the state median. Historical trend analysis indicates highly variable NVS transparency since monitoring began. Viewscope (VS) transparency was higher (better) than NVS transparency and likely a better measure of actual conditions.
- **Turbidity:** Epilimnetic, Pinkham Cove and Tanglewood Bk. turbidity levels were within a low range.
- **pH:** Epilimnetic, Pinkham Cove and Tanglewood Bk. pH levels were within the desirable range 6.5-8.0 units, however epilimnetic pH levels have historically fluctuated below the desirable range. Historical trend analysis indicates highly variable epilimnetic pH levels since monitoring began.





Station Name	Table 1. 2019 Average Water Quality Data for SUNRISE LAKE - MIDDLETON										
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color pcu	Cond. us/cm	E. coli mpn/100ml	Total P mg/l	Trans. m		Turb. ntu	pH
								NVS	VS		
Epilimnion	5.8	6.59	29	40	105.9		9	2.38	3.03	1.00	6.66
Main Beach						27					
Nicola Beach						3					
Nicola Beach 1						9					
Pinkham Cove					105.5	1	9			0.85	6.75
Tanglewood Brook			29		107.9		8			0.80	6.86
Town Beach						10					

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.5 mg/L
Chlorophyll-a: 4.39 ug/L
Conductivity: 42.3 uS/cm
Chloride: 5 mg/L
Total Phosphorus: 11 ug/L
Transparency: 3.3 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data highly variable.	Transparency	Stable	Trend not significant; data highly variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.